

**MAE/MSE 502 Partial Differential Equations in Engineering**  
Spring 2015 Monday/Wednesday 6:00-7:15 PM, Classroom: CAVC 101

Instructor: Huei-Ping Huang (hp.huang@asu.edu), ERC 359  
Office hours: Tuesday 3-5 PM, Thursday 3-5 PM, or by appointment

**Course website <http://www.public.asu.edu/~hhuang38/MAE502.html>**

## Course Outline

### ***I. Analytic treatment for linear PDE***

1. Overview of PDE  
Commonly encountered PDEs in engineering and science  
Types of PDEs, the physical phenomena they represent, and relevant boundary conditions
2. Method of separation of variables; eigenfunction expansion
3. Short review of Sturm-Louville Problem and orthogonal functions;  
Representation using orthogonal basis
4. Fourier Series  
Solution of ODE and PDE by Fourier Series expansion
5. Fourier transform and other integral transform methods  
Solution of PDE by Fourier transform; Behavior of solution in spectral space
6. PDE in non-Cartesian geometry
7. Forced problem and brief introduction to Green's function

### ***II. Additional topics***

8. Very brief introduction to nonlinear PDE  
Examples of nonlinear PDEs for real world phenomena; Behavior of their solutions;  
Conservation laws
9. Method of characteristics; Solutions of first order PDEs.

**Textbook:** *Applied Partial Differential Equation*, by R. Haberman, **Required**  
Additional lecture notes/slides will be provided by instructor

**Grade:** Homework 50% Midterm 20% Final 30%  
Specific rules for homework assignments will be released at a later time

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## Useful links

**Please make sure that you are familiar with ASU policies on academic integrity and campus safety:**

ASU policy on academic integrity: <https://provost.asu.edu/academicintegrity>  
Campus safety and security: <https://provost.asu.edu/University-Safety-Security>

**Grade and grading policies, contacts of advising office:**

Grade and grading policies: <https://students.asu.edu/grades>  
SEMTE advising: <http://semte.engineering.asu.edu/advising/>

**Useful websites for Matlab:**

ASU common software/applications portal: <https://apps.asu.edu> (login required)  
MATLAB searchable online documentation: [http://www.mathworks.com/help/techdoc/?s\\_iid=ML2013\\_bb\\_doc](http://www.mathworks.com/help/techdoc/?s_iid=ML2013_bb_doc)  
MATLAB online tutorial: <http://www.mathworks.com/help/matlab/examples/index.html>